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10/532,302

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT

PAPER NUMBER

1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/532,302	<b>Applicant(s)</b> ARICO ET AL.	
	<b>Examiner</b> Raymond Alejandro	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01/05/10.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 33-64 is/are pending in the application.
- 4a) Of the above claim(s) 51-64 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 33-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Amendment*

This office action is responsive to the amendment filed on 01/05/10. The applicant has overcome the objections. However, the rejections under Section 103 have not yet been overcome. Refer to the abovementioned amendment for substance of applicant's rebuttal arguments and remarks. Thus, all pending claims are finally rejected over the previously applied grounds of rejection as posited *infra* on the written record:

### *Election/Restrictions*

1. Claims 51-64 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 05/15/09.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
5. Claims 33-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication of Kim "*Cu-Ni Cermet Anodes for Direct Oxidation of Methane in Solid-Oxide Fuel Cells*" (herein called Kim) in view of Iacovangelo et al 4423122.

As to claims 33 and 44:

Kim discloses solid oxide fuel cells using anodes made of Cu-Ni alloys with ceramic materials (Cu-Ni cermet anodes) (*See Title, Abstract, Experimental and Results/Discussion*). The SOFC includes the anode, the cathode and the electrolyte (*See first column on 1st page & Experimental and Results/Discussion*).

As to claims 38-43:

The anode of Kim can be made of the following metal compositions 100 % Cu; 90 % Cu - 10 % Ni; 80 % Cu-20% Ni; 50 % Cu-50% Ni; and 100 % Ni (*See FIGURE 1 & Table*) or having the following weight ratio ranging from Cu-Ni (9:1) to Cu-Ni (4:1) (*See Table 1 &*

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*Results/Discussion*). The ceramic-metal (cermet) composites of Kim have alloy compositions of 0, 10, 20, 50 and 100 % Ni (Abstract).

As to claims 45, 48 and 49:

The ceramic material of Kim includes yttria-stabilized zirconia (YSZ) and/or LSM (a composition made of La-Sr-MnO<sub>3</sub>) (*See Experimental*). *With respect to claim 49, since one of the ceramic materials of the Markush group of claim 45 has been shown, it is unnecessary to show any one of the remaining ceramic materials thereof.*

As to claim 50:

Kim discloses the use of dry methane (Abstract).

Kim discloses a solid oxide fuel cell as described above. However, the preceding reference neither expressly disclose the specific particle size of both the alloy and the ceramic material nor the mean surface area.

As to claims 33-37 and 46-47:

Iacovangelo et al disclose electrodes for high temperature fuel cells (title, abstract) which are composed of a nickel-copper alloy encapsulated ceramic particle material (abstract/COL 1, lines 9-15/ COL 2, lines 50/COL 4, lines 25-30) wherein the particle size of the nickel-copper alloy ceramic material ranges from about 0.1 micron to about 20 microns (COL 2, lines 20-35/COL 3, lines 3-7). Iacovangelo et al further disclose that the specific size/thickness of the Ni-Cu depends largely on the size of the ceramic powder (Col 2, lines 63-67).

*In this case, the particle size of the nickel-copper alloy encapsulated ceramic particle material is taken to represent the particle size of both the alloy and the ceramic material as Iacovangelo et al does not appear to make a distinction between one and the other. Additionally,*

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*the mean surface area is considered to be an inherent characteristic or property present in the combined teachings of the prior art as the prior art shows substantially the same materials, and constitution thereof (i.e. particles). Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property, is necessarily present in the prior art material. “Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to make the electrode of Kim by having the specific particle sizes of both the alloy and ceramic material as instantly claimed because Iacovangelo et al teach that anodes having alloy and ceramic materials with the foregoing particle size do exhibit excellent electrochemical activity for the fuel cell reactions and make production on a commercial scale feasible. Moreover, Iacovangelo et al recognizes the particle size of the alloy and ceramic material as a variable which achieves a recognized result, thus, the claimed range of the particle size results from the characterization as routine experimentation of an optimum or workable range. Accordingly, the particle size is being construed as a result-effective variable. In re Aller 105 USPQ 233, 235; In re Hoeschele 160 USPQ 809, In re Antonie 195 USPQ 6 (MPEP 2144.05 II. Optimization of Ranges). Generally speaking, differences in sizes or dimension will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such size or dimension is critical. “[W]here the general conditions of a

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*claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is prima-facie obvious to choose or select the specific particle size of the alloy and ceramic material. **See MPEP 2144.05 Obviousness of Ranges.** Further, where the only difference between the prior art and the claims is a recitation of relative dimensions (changes in size/proportion) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art feature, article, element, or member, the claimed feature, article, element, or member is not patentably distinct from the prior art feature, article, element, or member. That is, limitations relating to the size of the feature, article, element, or member are not sufficient to patentably distinguish over the prior art as it is noted that changes in size is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular size of the claimed particle is significant. In re Rose 105 USPQ 237; In re Rinehart 189 USPQ 143; In Gardner v. TEC Systems, Inc., 220 USPQ 777 & 225 USPQ 232, (See **MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale**)*

6. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim “*Cu-Ni Cermet Anodes for Direct Oxidation of Methane in Solid-Oxide Fuel Cells*” (herein called Kim) in view of Iacovangelo et al 4423122 as applied to claim 45 above, and further in view of Batawi et al 2002/0061429.

Kim and Iacovangelo et al are both applied, argued and incorporated herein for the reasons above. However, none of the preceding references expressly disclose the specific doping material.

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Batawi et al disclose that it is known in the art to dope ceramic material used for solid oxide fuel cell anode with at least Ca and/or Y, among others (CLAIM 3, abstract).

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to dope the ceramic material of Kim and Iacovangelo et al with the specific doping material of Batawi as Batawi et al teach that such a doping material enhances the electrochemical characteristic of the ceramic material, and make the ceramic material more chemically stable and compatible.

7. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim “*Cu-Ni Cermet Anodes for Direct Oxidation of Methane in Solid-Oxide Fuel Cells*” (herein called Kim) in view of Iacovangelo et al 4423122 as applied to claim 45 above, and further in view of the publication Livermore “*Fuel reforming and electrical performance studies in intermediate temperature ceria-gadolinia-based SOFCs*” (herein called Livermore).

Kim and Iacovangelo et al are both applied, argued and incorporated herein for the reasons above. However, none of the preceding references expressly disclose the specific ceramic material.

Livermore discloses SOFC using anodes made of ceria-gadolinia (CGO) materials (abstract, title, Introduction).

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ceramic material of Livermore as the anode in the solid oxide fuel cell of Kim and Iacovangelo et al as Livermore shows that such a material enhances



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electrical performance and durability of the anode, and also shows good electrochemical and reforming activity.

### ***Response to Arguments***

8. Applicant's arguments filed 01/05/10 have been fully considered but they are not persuasive.

9. Applicant has provided a lengthy discussion as to why the claimed invention comprising a solid oxide fuel cell comprising the particular anode is patentable over the prior art of record and/or their respective teachings. In doing so, applicant has put a great deal of emphasis on the fact that the prior art fails to describe or disclose “*the claimed average particle size not higher than 20 nm*”(see pages 10-17 in the Remarks section of the 01/05/10 amendment). Because of this limitation, applicant further argues that “*there is no teaching or any suggestion that a specific combination of the claimed anode materials with a specific average particle size of the alloy of the anode of the solid oxide fuel cell would have any effect on the fuel cell*”; that “*it is possible to obtain a solid oxide fuel cell (1) with high efficiency, (2) over time, (3) in a wide range of temperatures, and (4) when fed with different fuels*”; that “*it is possible to avoid carbon deposition/formation*”; and that secondary reference “*Iacovangelo is concerned with a very different technical problem i.e. the difficulty in fabricating single metal plated powders into porous sintered electrode structures*”.

In reply, in addition to passages in the grounds of rejection above directly addressing why the claimed range is considered unpatentable in light of the prior art disclosures and settled law applicable to ranges, result-effective variables, and dimensions or sizes of a feature which are

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herein incorporated by reference in order to rebut applicant's arguments concerning the average particle size, the examiner invites the applicant to re-read, review, re-inspect or re-observe the specifics of the language recited independent claim 1. It is imperative to note that independent claim 1 recites "*an average particle size not higher than 20 nm*" (see claim 1). As such, it is the position of the examiner that such a limitation does include 0 (zero) as a lower limit.

Consequently, the foregoing limitation also reads on "*an anode comprising a ceramic material (with no alloy as an average particle size of 0 nm represents no alloy at all*", "*free of alloy*" or with "*an alloy having an average particle size of 0 nm*" at all. See MPEP 2173.05(c) Numeral Ranges & Amounts Limitations, II. Open-Ended Numerical Ranges. The reason to establish this analysis is based on the fact that the claimed anode can be comprised of: a) **a ceramic material** and b) the claimed alloy, and if no alloy is present due to having a particle size "*not higher than 20 nm*" such as 0 nm, the claimed anode is still comprised of **a ceramic material** and would be functional. Therefore, it cannot be said that there is no material forming the anode; or that the anode is "empty"; or that the anode comprises a null set of materials. Because the arguments raised by the applicant against the prior art rejections DO NOT address this issue, let alone the claimed invention as recited in the claims in dispute, the examiner verily believes that the above grounds of rejection *still read* on applicant's rejection independently of the disclosed range of the particle size. Simply put, an embodiment of applicant's claimed invention does not necessarily include the claimed alloy as part of the anode comprising a ceramic material, and because said embodiment is fully circumscribed by the teachings of the prior art which clearly include a SOFC comprising: i) a cathode, ii) an electrolyte membrane, and iii) an anode comprising a ceramic material as instantly claimed, the prior art still reads on applicant's invention, and it fully

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satisfies the requirement so claimed. As a clarifying matter, the examiner is not trying to play semantic here, the examiner is merely identifying a ***broadly claimed embodiment*** in which the invention of the applicant may lack the claimed alloy, or may not necessarily include the same.

10. In further response to applicant's argument that "it is possible to obtain a solid oxide fuel cell (1) with high efficiency, (2) over time, (3) in a wide range of temperatures, and (4) when fed with different fuels"; that "it is possible to avoid carbon deposition/formation", the fact that applicant has recognized another advantage or disadvantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). A motivation under Section 103 does NOT require that a combination be the preferred or most desirable. Moreover, a finding that the prior art as a whole suggests the desirability of a particular combination need not be supported by a finding that the prior art suggests that the combination claimed by the patent applicant is the preferred, or most desirable, combination. In other words, it is not required that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention. The question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination (*i.e.* *a fuel cell comprising, inter alia, an anode comprising a ceramic material and alloy with a particular average particle size*), not whether there is something in the prior art as a whole to suggest that the combination is the most desirable combination available. As a result, applicant's

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arguments are still insufficient to overcome this rejection, and therefore, the applied disclosure which also encompasses a limited number of alloy materials with a particular particle size.

11. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. (***Emphasis added***) Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). This is to further address applicant's arguments that “*there is no teaching or any suggestion that a specific combination of the claimed anode materials with a specific average particle size of the alloy of the anode of the solid oxide fuel cell would have any effect on the fuel cell*”, and that secondary reference “*Iacovangelo is concerned with a very different technical problem i.e. the difficulty in fabricating single metal plated powders into porous sintered electrode structures*”. Burden of proof is also on applicant to demonstrate or show evidence, in this particular case, as to why the modifying feature or element of Iacovangelo’ 122, when added to the fuel cell of Kim, would cause detrimental, deleterious, catastrophic, or fatal damages thereto. Such a burden has

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not been shown or addressed by the applicant. In short, the arguments of counsel cannot take the place of evidence in the record. An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of inherent anticipation/obviousness. That is to say, a statement or argument by the attorney is not factual evidence. (See ***MPEP 716.01 and 2145 Consideration of Applicant's Rebuttal Arguments***).

12. With respect to applicant's argument about " *'the particularly surprising' results discussed in the specification at p. 3, lines 12-22 and p. 18, lines 11-17*", the examiner simply contends that the evidence of secondary consideration is not commensurate in scope with the claimed invention. For instance, the superior results referenced by the applicant therein are directly related to at least one of EXAMPLES 1-9 discussed on pages 10-17 in the as-filed specification. That said, it is worthwhile to note that in ALL of EXAMPLES 1-9, the particular composition of the anodes along with their particular molar amounts, elements constituting the same, and particle size-distribution are more than WELL-DEFINED. Since the claimed invention is completely silent about the specific composition, elements, molar amounts, and particle size in manner to be consistent with at least any one of EXAMPLES 1-9, it is deemed that the claimed invention does not circumscribe any one of the disclosed embodiments in order to establish a coherent compositional or functional relationship therebetween, and/or an inference that the plethora of possibilities encompassed by the broadly claimed invention is illustrative or reflective of the superior results attributed to any one of disclosed EXAMPLES 1-9.

***Conclusion***

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/  
Primary Examiner, Art Unit 1795